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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/033,854	12/19/2001	Mahesh Sambasivam	42390P13267	9103

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BLAKELY SOKOLOFF TAYLOR & ZAFMAN  
12400 WILSHIRE BOULEVARD, SEVENTH FLOOR  
LOS ANGELES, CA 90025

EXAMINER

NGUYEN, KHIEM D

ART UNIT PAPER NUMBER

2823

DATE MAILED: 03/31/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/033,854

Applicant(s)

SAMBASIVAM ET AL.

Examiner

Khiem D Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Response to Amendment*

Applicant's arguments filed December 19<sup>th</sup>, 2003 have been fully considered but they are not persuasive. The Rejection from paper No. 11 sent August 21<sup>st</sup>, 2003 is incorporated in this paper. It is presented here for convenience.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in combination with Akram et al. (U.S. Patent No. 5,766,982) and Cha et al (U.S. Patent No. 6,242,798).

AAPA discloses in **figures 12-18** and related text of the specification a method of fabricating a microelectric package comprising providing a substrate (**figure 12: 204**) having a first surface (**figure 12: 214**), and opposing second surface, and a plurality of lands (**figure 12: 212**) disposed on the first surface; providing a microelectronic die (**figure 12: 202**) having an active surface (**figure 12: 208**), a back surface, and a plurality of pads (**figure 12: 206**) disposed on the active surface in a corresponding relationship to the plurality of substrate lands; electrically attaching the plurality of substrate lands to the plurality of corresponding microelectronic die pads with a plurality of conductive bumps (**figure 12: 216**); disposing an underfill material (**figure 13: 222**) such that the underfill

material is dispersed between the microelectronic die active surface and the substrate first surface wherein the underfill material is dispensed by a needle (**figure 13, 230**) and the underfill material comprises an epoxy material (page 3, line 6) and is cured (page 3, line 10).

**AAPA** also discloses providing a second microelectronic die (**figure 17: 242**) having an active surface (**figure 17: 256**), a back surface (**figure 17: 244**) and at least one wirebond pad (**figure 17: 254**) disposed on the active surface, attaching the second microelectronic die back surface to the microelectronic die back surface (figure 17) and attaching at least one wirebond (**figure 17: 252**) between the at least one substrate wirebond land (**figure 17: 258**) and the second microelectronic wirebond pad, wherein attaching the second microelectronic die back surface to the microelectronic die back surface comprises disposing a layer of adhesive therebetween (page 4, line 5).

**AAPA** fails to disclose forming a through hole extending from the substrate first surface to the substrate second surface and disposing the underfill material through the through hole.

**Akram** discloses in (col. 6, line 34 to col. 7, line 30 and figures 5-7) a method of fabricating a microelectric package comprising providing a substrate (**figure 5: 10**) having a first surface (**figure 5: 18**), an opposing second surface; forming a through-hole (**figure 5: 60**) extending from the substrate first surface to the substrate second surface; providing a microelectronic die (**figure 5: 12**) having an active surface (**figure 5: 20**), a back surface, and a plurality of pads (**figure 5: 22**) disposed on the active surface in a corresponding relationship to the plurality of substrate lands; electrically attaching the

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plurality of substrate lands to the plurality of corresponding microelectronic die pads with a plurality of conductive bumps (**figure 5: 24**); and disposing an underfill material through the through-hole (**figure 5: 28**) such that the underfill material is dispersed by capillary action (col. 1, lines 46-58 and **FIG. 5**) between the microelectronic die active surface and the substrate first surface wherein the underfill material is dispensed by a dispensing needle (**figure 5: 34**) and the underfill material comprises an epoxy material (col. 1, lines 46-58) and is cured (col. 7, lines 16-30). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Akram with the method of AAPA in order to prevent the underfill material from spreading beyond the sidewalls of the semiconductor device (col. 3, lines 2-3).

Neither AAPA nor Akram disclose positioning the microelectronic die and the substrate such that the microelectronic die is gravitationally below the substrate.

However, Cha et al discloses that epoxy can be applied from the top down through a through hole instead of injected upward (**figure 5B** and col. 4, lines 5-20). It would have been obvious to one of ordinary skill at the time of the invention to combine the teachings of Cha with the combined method AAPA and Akram in order to provide a reduced processing time and decreased solder fatigue (col. 2, lines 30-40).

#### ***Response to Amendment***

#### ***Response to Applicant's Arguments***

Applicant's arguments filed December 19<sup>th</sup>, 2003 have been fully considered but they are not persuasive.

In response to Applicants' argument that Akram patent does not teach or suggest the underfill material being dispersed by capillary action as presently claimed, examiner respectfully disagree. Applicants are directed to (col. 1, lines 46-58) where Akram provides evidence that the process of dispersing the underfill material into the gap between flip chip and the substrate by capillary action is known. For this reason, examiner holds the rejection proper.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D Nguyen whose telephone number is (571) 272-1865. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

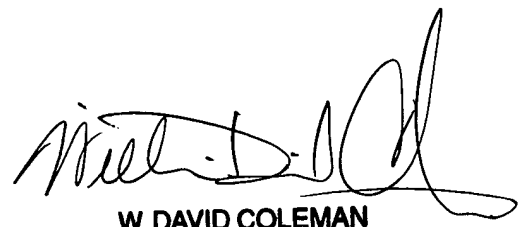
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (571) 272-1855. The fax phone numbers

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for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

K.N.  
March 27, 2004



**W. DAVID COLEMAN**  
**PRIMARY EXAMINER**